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Army Small Business Innovation Research: a survey of Phase II awardees

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THESIS

ARMY SMALL BUSINESS INNOVATION RESEARCH: A SURVEY OF PHASE II AWARDEES

by

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June 2001

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The shift towards qualifying performance and accounting for results has dramatically changed the way Government executes public policy objectives. The advent of the Government Performance and Results Act (GPRA) places the responsibility for gathering this information upon each Federal activity subject to its provisions. The Army SBIR program must now find a way to qualify its performance and determine what results are derived from a program that expends in excess of $100,000,000 annually on research. This thesis analyses Army Small Business Innovation Research (SBIR) commercialization rates against a National Science Foundation study of DoD Fast Track and DoD Control Group awards. It provides an objective measure of program results that program officials can use to submit their annual GPRA performance reports. The thesis studied 37 SBIR Phase II firms and established a performance baseline. The thesis concludes that Army SBIR awards are outperforming DoD Fast Track and DoD Control Groups in the critical area of average commercial sales per award. It recommends a reduced focus on outside investment and a survey strategy that uses small sample sizes to qualify program performance. It concludes with a proposed survey instrument that Army SBIR managers can use to capture future program outcomes.

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ARMY SMALL BUSINESS INNOVATION RESEARCH: A SURVEY OF PHASE II AWARDEES

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ABSTRACT

The shift towards qualifying performance and accounting for results has dramatically changed the way Government executes public policy objectives. The advent of the Government Performance and Results Act (GPRA) places the responsibility for gathering this information upon each Federal activity subject to its provisions. The Army Small Business Innovation Research (SBIR) program must now find a way to qualify its performance and determine what results are derived from a program that expends in excess of $100,000,000 annually on research. This thesis analyses Army SBIR commercialization rates against a National Science Foundation study of DoD Fast Track and DoD Control Group awards. It provides an objective measure of program results that program officials can use to submit their annual GPRA performance reports. The thesis studied 37 SBIR Phase II firms and established a performance baseline. The thesis concludes that Army SBIR awards are outperforming DoD Fast Track and DoD Control Groups in the critical area of average commercial sales per award. It recommends a reduced focus on outside investment and a survey strategy that uses small sample sizes to qualify program performance. It concludes with a proposed survey instrument that Army SBIR managers can use to capture future program outcomes.

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LIST OF ACRONYMS

AMC	Army Material Command
ARO-W	Army Research Office – Washington
DoD	Department of Defense
GAO	General Accounting Office
GPRA	Government Performance and Results Act
NSF	National Science Foundation
PEO	Program Executive Office
PM	Program Manager
RDEC	Research Development and Engineering Center
SBIR	Small Business Innovation Research

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I. INTRODUCTION

A. GENERAL

> "The relative weight that should be given to [agency] goals when evaluating proposals remains unclear." (Ref. 1: p.7)

The Small Business Innovation Research (SBIR) program provides significant opportunities for small businesses to participate in Federal Government research and development efforts every year. The program awards contracts to small companies that demonstrate in a competitive proposal process that they can perform innovative research and development that serves a Department of Defense (DoD) need. It also seeks to fund efforts that provide important commercial applications that add to national economic objectives. The method DoD uses to accomplish this goal is to provide funding up to $850,000 directly to each award winner for a specific research topic.

Since its inception in 1982, the program has evolved to reflect a compilation of agency goals indicative of a public program with multiple stakeholders. This project will elucidate how those goals impact program execution.

1. The Problem

All Federal agencies with extramural budgets for research and development are required to set aside 2 1/2 % of their total research/research and development funds to support the SBIR program. The presenting problem that this thesis will address is that the allocation of precious resource funds expended on this program are not adequately being accounted for in terms of results in accordance with the Government Performance Results Act of 1993. Without a full accounting of benefits derived from the program, it is

impossible to quantitatively assess whether the program is successful in meeting the stated goals of the principle stakeholders.

2. Potential Solutions

The researcher proposes three key changes to the Army Research Office's standard operating procedures: 1) Reduce its emphasis on outside investment as an evaluation criterion; 2) Conduct regular program surveys and ; 3) Use small survey populations to develop annual program results reports.

3. What Happens if the Problem Remains Unanswered?

If the program continues to exist in its current form without the controls or feedback loops needed to assess program success, the difficulty in determining a return on investment for the allocation of Federal research and development funds will continue. This potential misallocation of resources will produce an opportunity cost to the taxpayer and reduce Government efficiency.

B. OBJECTIVES

The objectives of this project are to determine if a correlation between technology sales and commercialization potential exist to support the Army's current evaluation criteria and to measure the prospects of commercial sales on the technical approach taken by prospective firms. It also seeks to validate whether current procedures are effective in satisfying agency goals and objectives and fulfilling Congressional intent. The completed thesis will build upon an earlier body of research conducted on projects from 1994-1996 and address public law, acquisition principles, and agency specific strategic plans.

C. RESEARCH QUESTIONS

The following research questions will be answered by the thesis.

1. Primary Research Question

How does the Army define and measure Small Business Innovation Research (SBIR) Program success?

2. Subsidiary Research Questions

- What are the Small Business Innovation Research (SBIR) and Fast Track Programs?
- What are the stated goals of the DoD SBIR Program?
- What are the various laws, regulations, and policies that might affect the SBIR and Fast Track Programs?
- What major products are created through the Army SBIR program and how does the Department of Defense integrate those products into its inventory?
- How does the Department of the Army track the commercialization of SBIR products through the program's life cycle?
- Do current Department of the Army requirements generation, marketing, solicitation, proposal evaluation, source selection and surveillance procedures lead to enhanced program success and greater commercialization of products?
- What changes are needed to the Department of the Army's SBIR Program to enhance the program's performance as it relates to stated goals?

D. SCOPE, LIMITATIONS, AND ASSUMPTIONS

1. Scope

The scope of this thesis will include: (1) an in-depth review of the SBIR program and its stated goals, (2) an evaluation of the current proposal selection process, and (3) an objective analysis of whether the current system is optimizing program execution. The thesis will conclude with proposed recommendations for optimizing program execution.

2. Limitations

The research will be limited by the fact that the Army SBIR Program has not undergone any exhaustive analysis of its effectiveness in producing outcomes.

Furthermore, due to the limited resources, feedback mechanisms for ascertaining conclusive commercialization results via product or process tracking for all Phase II participants are not available.

3. Assumptions

The following assumption will be used in preparing the thesis report.

a. Any reader of the thesis is assumed to have a fundamental understanding of the Defense Department and Army in general, and at least a surface familiarity with the procedures and functions associated with the acquisition community.

b. It is assumed that the provisions of the Small Business Innovation Research Program Reauthorization Act of 1999 will remain in force until 2008.

c. It is assumed that the Army SBIR Program's standing operating procedures will remain fundamentally unchanged for the foreseeable future.

E. DEFINITIONS AND ABBREVIATIONS

A complete list of pertinent acronyms is provided in the Acronym listing in the front of this document. Several key terms, however, are shown below.

1. Research and Development

Any activity that is: (Ref. 2)

(a) A systematic, intensive study directed toward greater knowledge or understanding of the subject studied.

(b) A systematic study directed specifically toward applying new knowledge to meet a recognized need.

(c) A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

2. Commercialization

The process of developing markets and producing and delivering products for sale (whether by the originating party or by others), as used here, commercialization includes both Government and commercial markets. (Ref 2)

3. Fast Track

An expedited proposal evaluation process that requires third party investment for participation. This program affords research firms that arrange for third party investment to experience significantly higher chances of contract award by providing opportunities to leverage matching Federal funds of between $1 and $4 for every $1 the investor provides. (Ref 2)

4. Extramural Budget

The sum of the total obligations of research/research and development minus amounts obligated for Research/research and development activities by employees of the agency in or through Government-owned, Government-operated facilities. (Ref 2)

5. Funding Agreement

Any contract, grant, or cooperative agreement entered into between any Federal agency and any small business concern for the performance of experimental, developments, or research work funded in whole or in part by the Federal Government. (Ref 2)

6. Subcontract

Any agreement, other than one involving an employer-employee relationship, entered into by a Federal Government funding agreement awardees calling for supplies or services required solely for the performance of the original funding agreement. (Ref 2)

7. Small Business Concern

A small business concern is one that, at the time of award of Phase I and Phase II funding agreements, meets the following criteria: (Ref 2)

(a) Is independently owned and operated; is not dominant in the field of operation in which it is proposing; has its principal place of business located in the United States and is organized for profit.

(b) Is at least 50 percent owned, or in the case of a publicly owned business, at least 50 percent of its voting stock is owned by United States citizens or lawfully admitted permanent resident aliens.

(c) Has, including its affiliates, no more that 500 employees.

II. BACKGROUND

A. GENERAL

In order to facilitate the discussion, we must first explore the events leading to the formulation of the SBIR Program. This chapter will specifically address the introduction of the Small Business Innovation Development Act of 1982; the key provisions imposed by the Act; significant developments fostered through subsequent Acts; program goals; the organization structure and mission of the Army Research Office; and a description of the Fast Track Program.

B. SBIR PROGRAM INTRODUCTION

In an effort to support the inclusion of small business initiatives in research/research and development, Congress established the Small Business Innovation Development Act in 1982 (Ref 3) to provide increased opportunities for small businesses to participate in research/research and development, to increase employment, and to improve U.S. competitiveness.

The SBIR program was scheduled to expire on October 1, 1988. However, Congress initially extended the program to September 30, 1993. The reasons given for extending SBIR were that the program creates new jobs, increases productivity and economic growth, helps combat inflation, and stimulates exports. (Ref 4, p.3) In extending the program, Congress acknowledged that small business had not been receiving a fair share of Federal research/research and development dollars. In 1992, Congress enacted the Small Business Research and Development Enhancement Act which again extended SBIR, this time through October 1, 2000. President Bush signed

the bill into law on October 28, 1992. The current authorization (Ref 5) reauthorizes the program until September 30, 2008.

C. KEY PROVISIONS OF THE ACT

Federal Agencies with research and development budgets exceeding $100 million are required to set aside a portion of those funds to support the program. The minimum funding level has steadily increased with each successive reauthorization. The original bill required 1% of an agency's budget. Since then, the proportion has grown from 1.25% during 1987-1992 to 1.5% in 1993 and 1994 to 2% in 1995 and 1996. Since 1997, at least 2.5 percent of all extramural research funds exceeding the $100 million threshold have been set-aside for SBIR. (Ref 6, p.46)

D. SIGNIFICANT DEVELOPMENTS

In 1992, Congress reauthorized the act with significant modifications. The Small Business Research and Development Enhancement Act of 1992 applied a "commercialization" standard to the proposal selection process to encourage the promulgation of research with commercial market potential. The act defined commercialization as the process of developing markets and producing and delivering products for sale. (Ref 7) This major shift in focus altered how proposals would be evaluated in the future by placing a premium on a factor that, at times, influences the technical approach proposed by potential offerors.

A second major change within the framework of the program took place with the 1999 reauthorization. The Small Business Innovation Research Program Reauthorization Act of 1999, added reporting requirements that supported the Government Performance

and Results Act of 1993. It specifically mandated that agencies include as part of their annual performance plan: (Ref 8)

a) The establishment of performance goals to define the level of performance to be achieved.

b) The expression of such goals in an objective, quantifiable, and measurable form.

c) The establishment of performance indicators to be used in measuring outcomes from each program activity.

d) A benchmarking system for comparing actual program results with established performance goals.

e) A method to describe the means to be used to verify and validate measured values.

These reports are forwarded to the Committee on Small Business of the Senate, and the Committee on Science and the Committee on Small Business of the House of Representatives.

E. TOPIC GENERATION

At least six months prior to the release of the SBIR solicitation in May of each year, Army Research Office-Washington (ARO-W) issues a call for topics to the Labs and Research Development and Engineering Centers (RDEC) to be considered for inclusion in the solicitation. Each LAB or RDEC is allocated a number of topics based on current Army guidance and expected future SBIR budgets. Topic authors must be Army civilian or Army military personnel with requisite technical expertise and be

assigned to the cognizant Lab or RDEC or an associated Program Manager (PM) or Program Executive Office (PEO). The topic authors in the Labs and RDECs develop topics that address their respective organizations' objectives. Topic authors should also coordinate with their relevant battle Lab to get the "user" perspective. Finally, the topics submitted must be in accordance with the Lab and RDEC Technical Director's priorities. (Ref 9, p.10)

F. SBIR PROGRAM GOALS

The Small Business Innovation Research Program Reauthorization Act of 1992 forms the basis of the current program's execution. In the accompanying House Report, Congress noted that the program was highly successful in integrating small business in Federal research. (Ref 4, p.1) It further noted that small businesses were producing innovative goods and services, and that the program was the "catalyst in the promotion of research and development" for the nation's high-technology industries. (Ref 4, p.1) The report stressed the ability of small firms to capitalize on scientific and technical innovations and quickly transform those findings into new products and services thereby enhancing national economic growth. (Ref 4, p.4) The legislation addressed the congressional concern that although small businesses were the most productive source of significant innovation in the nation, their share of Federally funded research and development efforts was understated in terms of contribution. (Ref 7)

Congress designated four major goals (Ref 6, p.46) in authorizing the program to:

1) stimulate technological innovation;

2) use small business to meet Federal research and development needs;

3) foster and encourage participation by minority and disadvantaged persons in technological innovation; and

4) increase private-sector commercialization of innovations derived from Federal research and development.

G. SBIR PROGRAM PHASES

The SBIR program is subdivided into three distinct phases. Although each agency participating in the program has the autonomy to administer the program differently, the basic parameters which define each phase are essentially the same. For illustration, the researcher will outline the phases as they relate to Army program execution.

1. Phase I

Phase I is a feasibility study of approximately six months in duration. Only proposals which respond to specific Army topics published in the second of two annual DoD SBIR Program Solicitations are eligible for Phase I consideration. Funding for Phase I is not to exceed $70,000, with an additional $50,000 available as a separately priced option if that provision it is included with the initial proposal. The option may be exercised, at the Army's discretion, to fund start-up Phase II activities for those Phase I projects which have been selected for Phase II negotiation and award. (Ref 9, p.4)

2. Phase II

There is no solicitation for Phase II proposals, but successful Phase I firms may be invited by the Army to participate in Phase II of the SBIR Program where the primary R/R&D work is conducted. Phase II awards are two year efforts that are funded incrementally up to a maximum of $750,000. (Ref 9, p.4)

3. Phase III

Successful Phase III projects result in technologies, products, or services that can be marketed to Government or commercial customers outside the SBIR Program. This commercialization phase is the ultimate goal of each SBIR effort. By law, Phase III efforts can not incorporate SBIR funds. (Ref 9, p.5)

H. ARMY RESEARCH OFFICE ORGANIZATIONAL STRUCTURE

1. Organizational Structure

The Army Research Office-Washington (ARO-W), a subordinate office of the Army Research Office, is the parent organization of the Army's SBIR effort. It is structured with two distinct functions: ARO-W (A) manages the SBIR program and ARO-W (B) monitors and participates in DoD-wide science and technology activities that leverage the Army's investment in basic research.

2. Mission

The mission of ARO-W (A) is to serve as the liaison between ARO Headquarters and Army Materiel Command (AMC). The office's primary function is to execute Army-wide technology development in partnership with industry and academia through three unique programs: The Army Small Business Innovation Research (SBIR) Program, the Army Small Business Technology Transfer (STTR) Program, and the Advanced Concepts and Technology Program (ACT II). Each program has unique goals and operating parameters. The ARO-W acts as the executive agent for all Army SBIR activities and coordinates program actions within the Army's laboratories and RDECs. (Ref 10)

3. Proposal Evaluation

Proposal submissions are evaluated on scientific, technical, and commercial merit. Because of the proprietary nature of the criteria and associated weighting, that information will not be disclosed as a component of this report. The researcher acknowledges that commercial potential may have a significant impact upon approval of Phase II awards.

4. SBIR Marketing Assistance

The Army SBIR office expends considerable effort to publicize program innovations. They assist firms in marketing their products through the annual SBIR Phase III success booklet publication. This booklet is distributed throughout the Army; at National, Regional, and State-level SBIR Conferences and workshops. In many instances, representatives of large businesses and venture capital firms attend such events to "network" with Army SBIR firms. SBIR Phase III success stories are posted on the ARO-W website and are routinely provided to SBA and in response to Congressional-related request.

I. FAST TRACK PROGRAM

The DoD initiated the Fast Track program in an effort to improve the rate of SBIR commercialization. Starting with the 1996 solicitations, DoD initialed a two year pilot policy – the SBIR Fast Track – under which SBIR projects that attract matching funds from third-party investors have a significantly higher probability of SBIR award. Additionally, the SBIR program office expedites proposal evaluation and processing to reduce the delay in reaching the market. The purpose of the Fast Track policy is to concentrate SBIR funds on those research and development projects most likely to result in viable new products that DoD and other will buy. (Ref 6, p.52)

At the conclusion of the initial pilot period, the Under Secretary of Defense for Acquisition and Technology extended the Fast Track pilot for two additional years, because of the promising early results. The Under Secretary also directed an independent analysis of Fast Track. The National Research Council (NRC) was asked to conduct that analysis. (Ref 6, p.51) The study's focus covered a total of 379 DoD projects selected from among the 2,574 that received Phase II awards during 1992-1996. The sample contained award data from every agency operating under the DoD organizational structure.

The NRC analysis of results concluded that the Fast Track program was clearly outperforming DoD Control Group awards. The areas of sales, additional developmental funding and expected sales were all sighted as having higher aggregate values. (Ref 6, p.44)

J. PRIOR STUDIES

In 1991, the General Accounting office (GAO) conducted a study across all Federal agencies participating in the program to evaluate the aggregate commercial trends of products that were studied and funded through Phase II. The 1991 survey questionnaire was sent to all Phase II awardees from the first four years of Phase II program awards: 1984-1987. The GAO selected the earliest recipients because studies by technology experts concluded that the incubation period for a concept to progress to a commercial product was five to nine years. (Ref 6, p.51)

K. GOVERNMENT PERFORMANCE AND RESULTS ACT

Congress passed the Government Performance and Results Act (GPRA) as part of a legislative framework to instill performance-based management in the Federal

Government. The Results Act established a management system to set agency goals for program performance and to measure results against those goals. In enacting the Act, Congress and the administration realized that the transition to result-oriented management would not be easy. For that reason, the Act provided for a phased approach to implementation. (Ref 11)

Implementing the GPRA in a research environment is particularly challenging. In the past, research agencies have cited numerous barriers to their efforts to establish results-oriented goals and measures. (Ref 12) The barriers include problems in obtaining data to demonstrate results, accounting for factors outside of the agency's control that affect results, and dealing with the long time periods often needed to see results.

Over the past several years, the Government Accounting Office has issued reports that identified practices for improving GPRA implementation in Federal agencies. These reports have focused on, among other things, overcoming agency specific barriers, improving the usefulness of annual performance plans, and measuring program results that are under limited Federal control. These reports point out the depth and scope of management practices needed to successfully implement performance-based management as envisioned under the GPRA. (Ref 11)

L. SUMMARY

This chapter provided essential background information on the SBIR Program designed to enhance the readers' understanding. It focused primarily on the origins of the program, significant developments, and basic structural framework. The chapter concluded with a short synopsis of the Government Performance and Results Act and its

influence on reporting results. The following chapter will discuss the research methodology used to gather data for analysis.

III. RESEARCH METHODOLOGY

A. GENERAL

The research methodology used to gather data for the thesis centered on two primary means: personal interviews with the program manager and program executors and a survey questionnaire focused on previous award recipients. Chronologically, there was an initial interview that launched the research process, followed by the transmission of the survey questionnaire, and then the conduct of an additional personal interview with the Army Research Office SBIR Program Manager. Each of these steps is discussed below.

B. INITIAL PERSONAL INTERVIEW

The purpose of the initial interview was to ascertain whether an objective analysis of the SBIR Program was feasible and to determine how the Army Research Office was obtaining, assessing, and reporting the performance of contractors that had participated in the program. The goal of this phase was to set the direction for further research exploration.

During the initial interview, (Ref 13) a program support contractor supporting the Army Research Office SBIR effort, provided his insight. He was instrumental in assessing the state of the program and offering a unique perspective into the program that shaped the direction of the project.

C. SURVEY QUESTIONNAIRE

The survey was conducted draw a parallel between prior studies and current practice. The goal was to produce a baseline for comparison that could be used to measure program results attributable to previous changes in organizational practices. The

method for selecting the survey recipients (target audience), and constructing the actual questionnaire (survey design) are presented in the following paragraphs.

1. Target Audience

Given the popularity of the SBIR Program, the researcher decided that the best strategy for conducting the survey would be to analyze Phase II awards for both Fast Track and non-Fast Track participants in a given period. A target audience was selected using only those firms that received a Phase II award from 1996 through 1998. The researcher determined that only those firms that had matriculated through Phase II would be able to provide any return on investment for the taxpayer via commercialization of technology derived from the program. The critical factor in pursuing such a focus was to preempt any claim of sampling error or survey variance by surveying a statistically significant number of firms.

The target audience analysis rationale was directly attributable to program guidelines that allow the ARO to invite only selected firms to negotiate Phase I interim and Phase II awards. (Ref 14) Phase I interim awards were excluded because of database constraints that limited their validity. The 1996 date reflected the last fiscal year in which SBIR program research proposals were evaluated in the National Science Foundation study. (Ref 6) Finally, the latter date represented the last year a firm would have had to begin research in order to complete the Phase II effort before moving into Phase III. This cutoff date was further supported by analysis of the so-called two-year "incubation" period after Phase II completion that firms experience before any innovations can be brought to the marketplace. (Ref 15)

A search of the SBIR Award Database at the Office of Small and Disadvantaged Business Utilization for the Office of the Secretary of Defense served as the starting point for identifying specific survey participants. (Ref 6) The researcher identified 324 Phase II awardees that fit the target audience profile. A sample population of 65 firms was randomly selected from the SBA Technet database for the study. An attempt was then made to telephonically contact each firm identified on the list in order to determine two points: 1) if the firm was still in existence and 2) to ascertain who in the firm would serve as the point of contact for the questionnaire. The researcher hoped that by phoning each firm, locating the original researcher listed in the database, and explaining the concept of the project before sending the questionnaire would serve to raise the response rate. Of the 65 firms on the initial target audience list, 49 firms (75%) were contacted and identified as survey recipients. Sixteen firms (25%) identified on the target audience lists were deleted due to bankruptcy, restructuring, loss of internal documentation, merger, or an unwillingness to participate. Of the 49 surveys transmitted, 37 surveys were returned yielding a response rate of 76%.

2. Survey Sample Size

Given the responsiveness noted above, it is appropriate to ask whether the sample was large enough so as to mitigate or eliminate any potential clams of sampling error. In other words, was the survey sample of sufficient size to provide a clear and reliable indication of the responses that would have been given if the entire Phase II award population had been surveyed? Johnson (Ref 17) states that "when [a] sampled distribution lacks symmetry, n (the number of observations) may have to be quite large (maybe 50 or more) before the normal distribution provides a satisfactory approximation" for the probability distribution of the mean. For the analysis contained in the next

chapter, the author assumes that the responses presented for analysis in Chapter IV are normally distributed.

The researcher used a combination of factors to determine the minimum required sample size using the largest standard deviation for the three scaled sub-components contained in the survey. When combined with a maximum desired error factor of +/-.30 points from the sample mean, a confidence coefficient of 80% (1.65), and standard deviation for the recorded responses of 1.0836, the computation yielded a sample size of 36 completed surveys. A total of 37 surveys were collected and analyzed.

3. Survey Design

The researcher had two concerns when constructing the survey questionnaire. The first was to design a survey that produced objective results that would allow for statistical analysis of the SBIR Program and commercialization rates. The second was to pose the questions/statements in such a way as to eliminate potential bias in the results. A survey questionnaire, as distributed to the target audience, is contained in Appendix A.

Given the concerns of the researcher, the questionnaire was designed with three sections. The first section addressed specific historical data for each contract the firm undertook. The purpose of this was to confirm that the information listed on the DoD Under Secretary of Defense Website database matched the SBA Technet database. The concept was to provide preliminary check of the validity of the information contained in the database to ensure that the comments and responses provided by the firm were credible.

The second section aimed to gather additional information that would facilitate further statistical analysis through the correlation of data derived from DoD SBIR

records. The final section's focus was to gain an understanding of each firm's perspective. It specifically sought to gain insight into how each firm was approaching the program and how various approaches were influenced by the firm's beliefs.

D. SECONDARY INTERVIEWS

Secondary Interviews were conducted two months after survey initiation. The purpose of the secondary interviews was to assess what policies key decision makers deemed essential to qualifying the results of the program. The underlying intent was to ascertain whether they viewed a reporting mechanism as necessary given the overwhelming Congressional support for the program.

E. SUMMARY

This chapter provided an in-depth discussion of the research methodology used to develop the survey instrument used to gather information for the thesis. It identified the purpose of the initial interview and the rationale supporting survey instrument development. Additionally, it identified the need for an assessment of the program from a policy-making perspective to ascertain how program results were viewed from a top-down perspective. The next chapter will present a statistical examination of the collected data and the summarized results of both sets of interviews.

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IV. DATA PRESENTATION AND ANALYSIS

A. INTRODUCTION

This chapter presents the results of a survey administered to SBIR Phase II participants. The target audience's responses are displayed in graphical form for ease of interpretation. The data and subsequent analysis presented in this section will illuminate how funding and program solicitation dynamics impact program results. This chapter will also discuss the economic impact of program outcomes for technologies and products developed as a direct result of the SBIR program.

The SBIR research survey instrument was based on a previous survey that the GAO conducted in 1992 and a National Science Foundation Paper. (Ref 6) New questions for the survey instrument were developed as a result of dialog between the researcher and the Army Research Office as well as from conversations with current SBIR Phase II participants. The final survey was reviewed and subsequent changes made with the assistance of a survey instrument expert at the Naval Postgraduate School. (Ref 18) The final survey reflected high face validity between intended and perceived meaning of the questions.

The SBIR survey was sent to 49 Phase II program participants during a three-month period starting February 2001. The survey yielded a 76% percent response rate with 37 firms meeting the feedback closing date. Participation was voluntary with the condition that individual survey responses would be strictly confidential. Table 4.1 represents the distribution of survey respondents. As far as can be determined, the survey sample appears to be representative of the entire award population.

Fiscal Year of Award	Target Audience	Survey Respondents	Percentage of Respondents
FY 96	16	12	75%
FY 97	19	16	84%
FY 98	14	9	64%
Total	49	37	76%

Table 4.1. Distribution of Survey Respondents.

(Source: Designed by researcher)

B. GROUP COMPARISON

The Army SBIR contract awards represent a cross section of awards given over a three year period from 1996 to 1998. The firms selected for participation were randomly chosen from the 324 contract awards negotiated during that period.

The survey data collected was analyzed against two groups for a basis of comparison. The first group of awards, 1996 DoD Fast Track award winners, consisted of firms that qualified under the Fast Track program for enhanced commercial potential. This group received special evaluation consideration and expedited proposal processing. These awards represented the "best in class" because of an optimal combination of sound technological approach, researcher credentials, and commercial potential as validated by third party investment funding.

The DoD control group represented a sample of all SBIR contracts across the DoD spectrum for fiscal 1996. They embody all of the salient characteristics of the research projects the program seeks to fund and constitute a baseline of what the average award should be.

C. RESPONSES TO DEVELOPMENTAL FUNDING AND SALES QUESTIONS

In this survey, firms were asked to provide quantifiable business outcomes as a direct result of their specific project. Developmental funding and sales questions asked

firms to describe the extent to which they were offering products developed under the program to the commercial market.

1. What Products Are Going to Market?

The SBIR program affords firms the opportunity to produce a myriad of products and services through innovative research. Figure 4.1 displays the types of products each surveyed group produces.

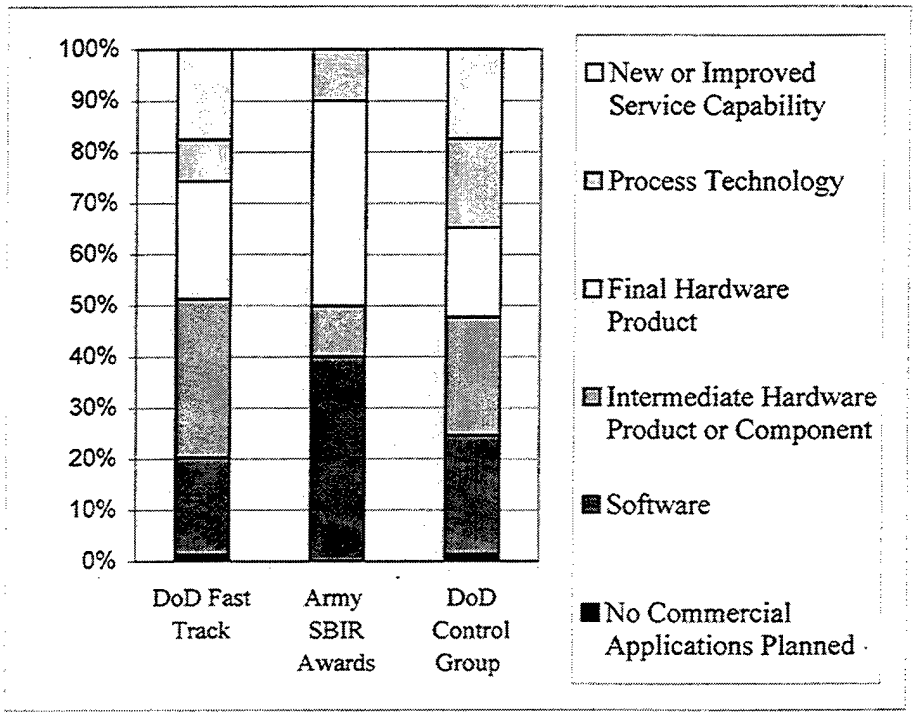

Figure 4.1 Distribution of Intended Commercial Product.
(Source: Designed by the researcher)

When compared against Fast Track awardees and the DoD Control Group, the Army SBIR group is heavy weighted towards software applications and final hardware products. This phenomenon is indicative of two key themes: a solicitation process that promotes material solutions to army requirements and a continuous push to digitize the force.

2. How do SBIR Firms Approach Marketing?

A marketing strategy can positively or negatively affect a firm's ability to move a product to market. Some of the best innovations "die on the vine" because they have sat idle on the shelf without a mechanism to move from the developer to the customer. Completing research and marketing a product can be a challenge for some firms because of the disparate skill sets needed to complete marketing tasks. Figure 4.2 illustrates how firms approached marketing from a company perspective with regard to staff hiring practices.

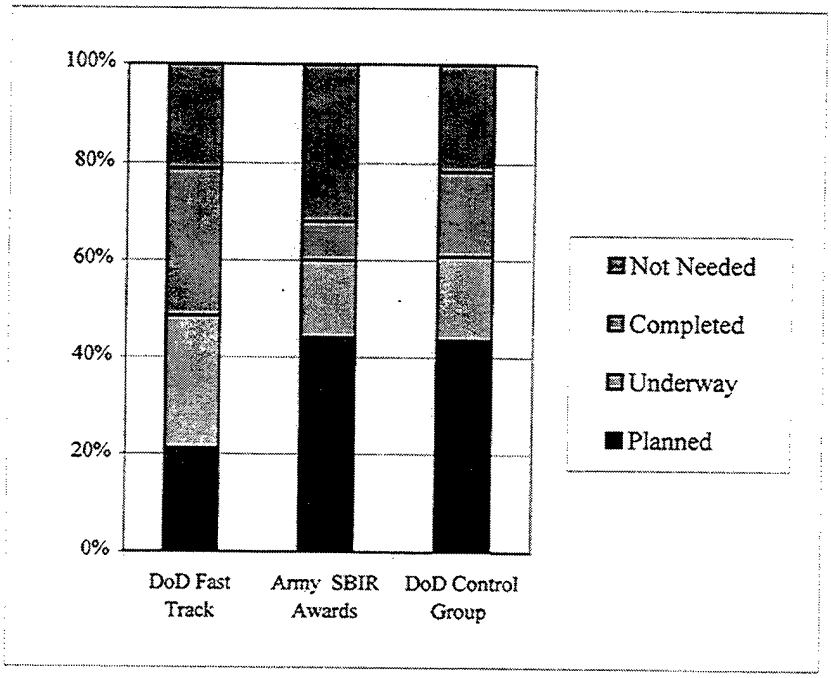

Figure 4.2 Marketing Staff Hiring Strategy
(Source: Designed by the researcher)

Of the 37 Army SBIR firms surveyed, 17 decided that there was a need for a marketing staff to facilitate interest in their product. Although this closely mirrors 78% of Fast Track firms, the difference between those two groups can be found in the percentage of firms having actually started the hiring process. Fast Track firms are much

more deliberate in their efforts to bring in expertise when the need is identified. The percentage of firms that have started or completed the marketing staff hiring process are 57% and 24% for Fast Track awardees and Army SBIR firms respectively. This is most likely attributed to the influence of the outside investment needed to qualify for Fast Track consideration. Conversely, Army SBIR firms move at a much slower pace. This may serve to hinder a firm's ability to realize commercial market sales.

3. SBIR Product Consumption

An analysis of Army SBIR sales data conclusively demonstrates that Army proposals are developed with a narrow focus on military applications. As a group, DoD purchased 85% of the total sales generated from Army SBIR funded technology. Figure 4.3 depicts sales by sector of the three groups and clearly reveals that DoD is the prime beneficiary of Army SBIR program objectives.

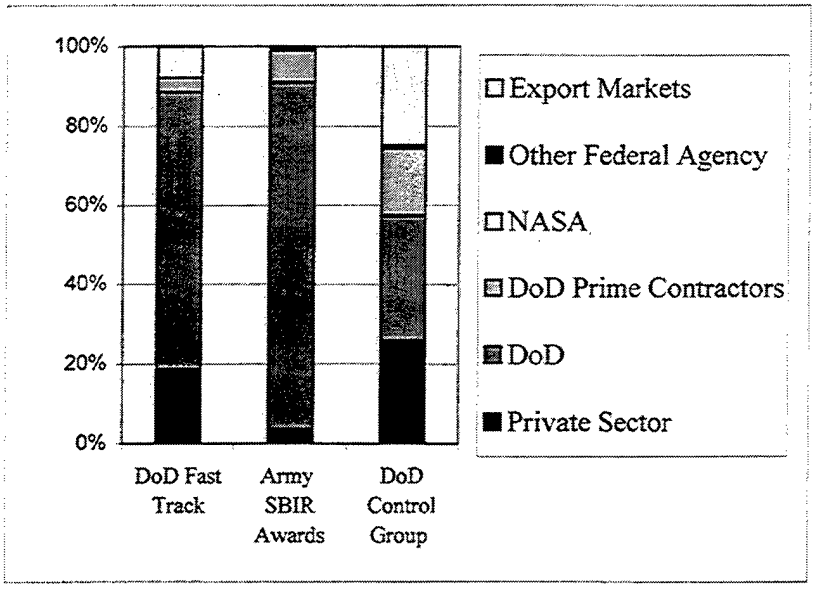

Figure 4.3 Customer Sales by Market

(Source: Designed by the researcher)

4. Average Total Sales

Average total sales data per award is a key performance metric. This figure represents an empirical measure that can assist program managers in objectively assessing program success via a return on investment analysis. Figure 4.4 graphically depicts how Army SBIR awards have performed against Fast Track awardees and the DoD Control Group.

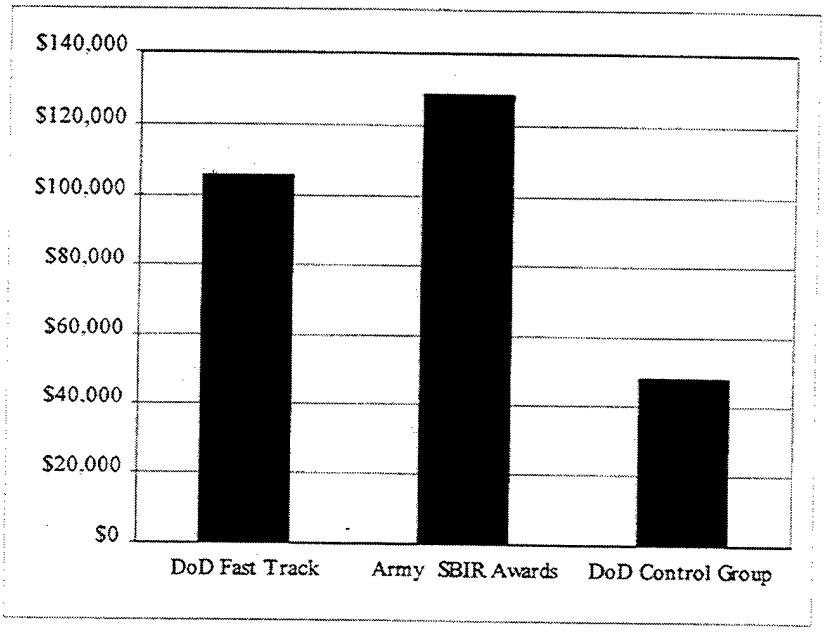

Figure 4.4 Average Total Sales

(Source: Designed by the researcher)

The exceptional performance of Army SBIR firms is an interesting outcome of the research. As a group, Army SBIR firms outperformed DoD Fast Track firms by 21% and the DoD Control Group by 164% per average total sales per award. These findings are particularly impressive given that the DoD consumes 85% of all Army SBIR products.

Ten firms surveyed commented that Army projects had clear linkages to Army and DoD requirements that created a ready market for their products. The availability of this market influenced nine of those ten firms to principally focus on rapidly developing their technologies to conform to DoD requirements first and then seek to exploit commercial opportunities. When this commitment is coupled with the aforementioned DoD market dominance, they create a synergy that magnifies program return on investment.

D. RESPONSES TO OTHER COMPANY AND PROJECT RELATED INFORMATION

Fostering ground-breaking research is a key tenet of the SBIR program. Given the responses, Army SBIR firms overwhelmingly conveyed that they would have not dedicated resources and effort to study Army topics. As a group, 16 Army SBIR firms responded that they would "Definitely Not" have explored the topic they received funding to study. Another 13 stated that they would "Probably Not" have opted to explore their specific topic. Those two subgroups combined represented 80% of the responses.

When compared against Fast Track awardees, the differences between the groups are significant. Only 13% of all Fast Track awardees stated that they would "Definitely Not" or "Probably Not" have studied the topic for which they received funding. This fact is a clear indication that research firms see little commercial value in the technologies the Army wants researched. When asked why they would not have researched their specific topic, 11 firms commented that they believed the purpose of the research was to meet a specific Army research requirement that did not have any "true" civilian applications.

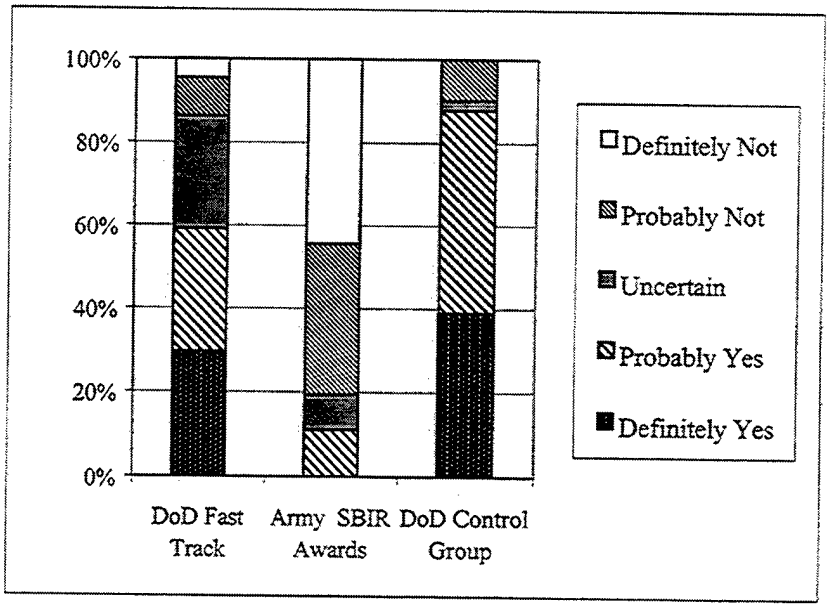

Figure 4.5 Probability of a Firm Independently Researching a SBIR Topic (Source: Designed by researcher)

E. PROGRAM PERCEPTIONS FROM SBIR PHASE II FIRMS

In the final portion of the survey, firms were asked to provide their opinions of various aspects affecting their overall perception of the program. A five-point Likert scale was used to formulate an assessment of how each firm felt about third party investment, technical approach, and marketing. Under this approach, one was selected to represent the highest score and five the lowest. The questions asked each firm to determine the extent to which they agreed or disagreed with specific principles affecting their proposal's ability to satisfy Army SBIR solicitation requirements. The scale used was as follows:

1 – Strongly Agree
2 – Agree
3 – Neither Agree nor Disagree
4 – Disagree
5 – Strongly Disagree

Scores closer to one (1) mean that responses displayed a high degree of association to the proposed statement. Scores closer to five (5) mean that responses displayed a high degree of association to the alternative hypothesis.

The summarized raw responses to each of the three statements in the Other Company and Project Related section questionnaire are provided on the following subsections. Each paragraph lists the statement posed to Phase II firms and presents a graphical depiction of the summarized responses. The mean of the responses, the standard deviation, and the Confidence Interval (CI) range are all described in detail below each graph.

The scaled responses are interpreted for favoring or disfavoring the impact of investment funding on program participation and proposal submission. A narrative analysis describes how the researcher interpreted the scaled responses.

Statement 25a – " I believe outside investment by a third party is proof of the commercial potential of a research project".

1. Statement 25a Graphic Representation.

See Figure 4.6 on following page.

2. Statement 25a Narrative Analysis.

The rationale for developing this statement was predicated on whether or not outside investment truly provides insight into a firm's ability to market its potential products thereby enhancing prospective sales. If a firm agreed with the statement, then we could infer that the firm would place a significant value in marketing their products throughout the research process to realize a faster return on investment for any

forthcoming developments. If a firm disagreed, we could infer that they did not place value in obtaining outside investment funding.

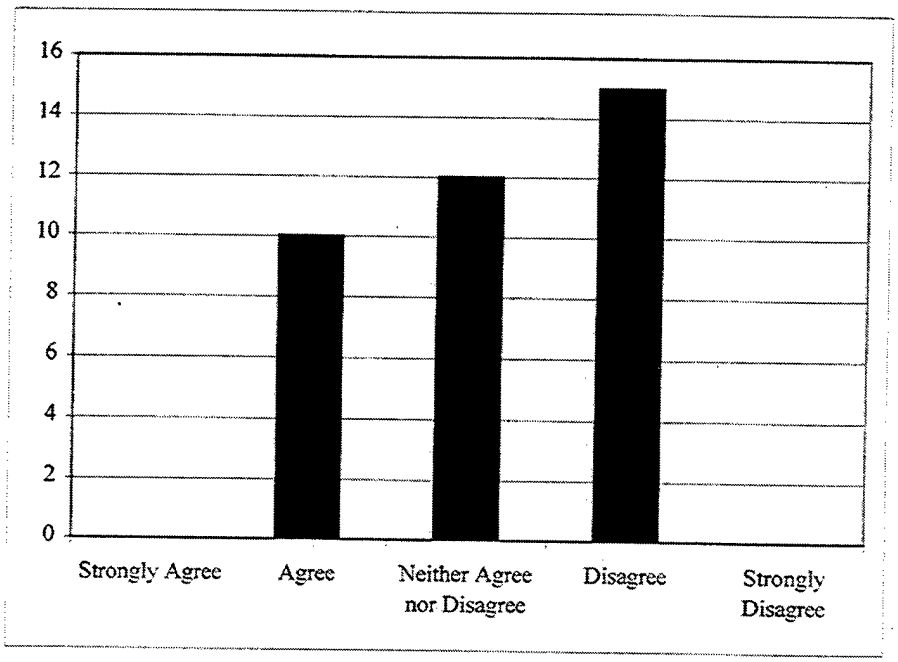

Figure 4.6 Frequency of Response to Statement 25a.
(Source: Designed by the researcher)

Mean Score:	3.1351
Standard Deviation:	0.822
CI Range:	2.9587-3.3116

The pattern of the oral and written comments tended to support both sides of the argument. 15 of the 37 respondents that disagreed with the statement cited a belief that outside investment in a SBIR firm during Phase I and II constituted a "proposal strategy" that served to gain preferential treatment via inclusion in the Fast Track program during the contract evaluation phase. Key words such as "manipulation" and "temporary loans" were used when describing how competing firms could make proposals look more promising on paper. One firm provided a detailed example where people could make

clandestine agreements with the so-called "investors" on a business loan and later pay the loan back to the "investor" once the Phase II funding is approved.

Four firms noted that audit procedures do not seem foolproof. In this situation, the "outside investment" is not truly an investment, it is simply a "temporary loan" to make it comply with Fast Track requirement, but in reality no "real" money is spent on the project.

The opposing view supported by 10 of the 37 firms cited the commitment of currency as the only method to effectively determine if a concept was worth exploring. Although none of the firms would commit to an extreme view of "Strongly Agree" or Strongly Disagree", their approach to this question dictated that determining a consensus on this issue would be difficult.

Statement 25b – "I would change a superior technical research approach to a slightly lesser technical research approach if I could gain access to outside investment."

3. Statement 25b Graphic Representation

See Figure 4.7 on the following page.

4. Statement 25b Narrative Analysis

The rationale for developing this statement was to determine if outside investment shaped the proposed research approach. If a firm agreed with the statement, then we could infer that they placed a greater value on potential commercial sales opportunities to non-DoD customers through the development of dual use technologies. Disagreement would suggest that firms thought their optimal proposed solution could be compromised by outside investor influence.

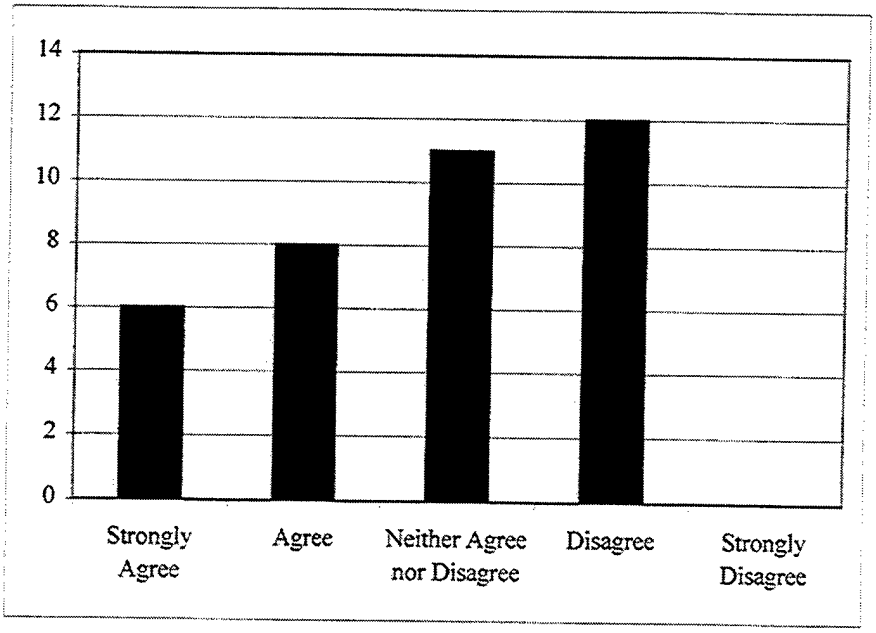

Figure 4.7 Frequency of Response to Statement 25b.
(Source: Designed by the researcher)

Mean Score:	2.7838
Standard Deviation:	1.0836
CI Range:	2.5512- 3.0164

The variance in responses for this technical approach question suggests that each firm decides a proposed course of action after careful examination of its own business considerations. Once internal and external factors are evaluated, companies will have to provide a balanced proposal that addresses both technical merit and the potential for commercialization.

The key point for program executors is to determine how best to structure solicitations to mitigate the influences of this decision making process while completely fulfilling agency specific research requirements. This dilemma represents an inherent conflict within the program because awards are required to support research that meets the needs of the awarding agencies, yet products developed are also expected to be

successful in the commercial marketplace. Eight of the 14 firms that responded with "Strongly Agree" or "Agree" cited this dilemma as a central tenant in their response. They indicated that business objectives forced them to utilize this approach as a means of maintaining competitiveness within their respective areas of expertise.

Seven of the 12 firms surveyed responded that they disagreed with the statement because of their belief that outside investors would influence the process to such a high degree that the final proposal might be evaluated as more than "slightly less" than optimal.

Statement 25c – "Raising the interest of outside investors for SBIR research topics is challenging."

5. Statement 25c Graphic Representation.

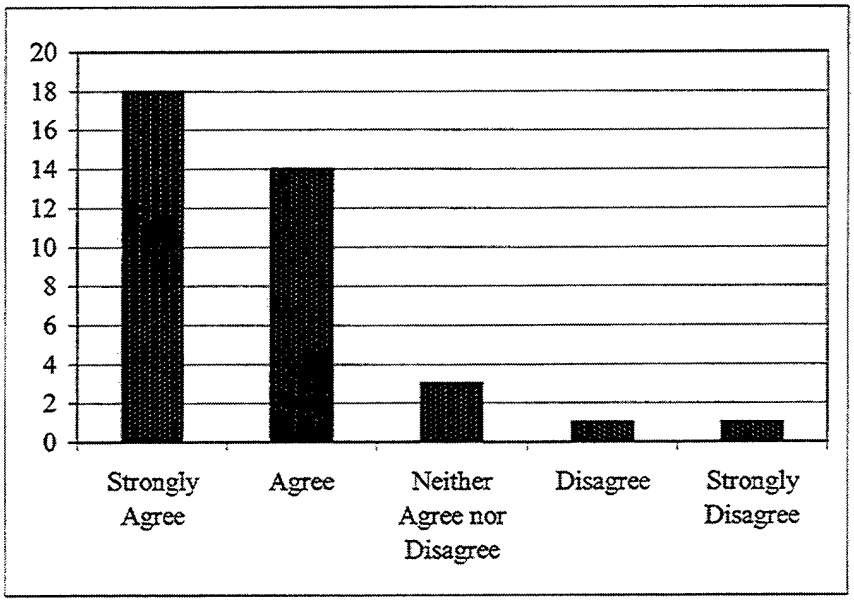

Figure 4.8 Frequency of Response to Statement 25c.

(Source: Designed by the researcher)

Mean Score: 1.7297
Standard Deviation: .9324
CI Range: 1.5296- 1.9298

6. Statement 25c Narrative Analysis.

The rational for developing this statement was that if respondents agreed with this assertion, then an argument could be made that Army SBIR topics were considered abstract and provided little commercial potential. Low levels of additional developmental funding and sales could potentially be subsequent outcomes of this reduced commercial potential.

Based on the low mean score of 1.7297 and the written and oral comments, the researcher surmises that there is a strong belief within the SBIR firms that SBIR projects are too narrowly constructed to appeal to outside investors seeking to exploit commercial applications. Although the program is satisfying Army research objectives, the data indicate that the SBIR program is continuing to fall short of commercial market expectations.

Eight of the 32 firms that responded with "Strongly Agree" or "Agree" noted that only a very small commercial market existed for the technologies they received an award to study. Four firms noted persistent problems with attracting capital. This was attributed to low commercialization prospects and the perception of low profitability with DoD contracts. Finally, One firm noted that they had tried to meet with a large firm in the same industry and could not because of fears of patent issues.

F. SBIR PROGRAM MANAGER INTERVIEW

The researcher conducted a personal interview with Dr. Kenneth Bannister, Army SBIR program manager, to ascertain how key policy makers viewed program execution. The interviews were conducted during the April 2001 Spring SBIR Conference in Crystal

City, Virginia. The purpose was to determine what, if any, steps were necessary to optimize the SBIR process.

When asked about sharing project results across the DoD/Government spectrum, Banister commented that SBIR results were published in booklets and brochures that are subsequently distributed throughout the business community via conferences, organizational websites, and the Defense Technical Information Center (DTIC). (Ref 20) He believes the effectiveness of these efforts to publicize the benefits of the program are commensurate to those used by other industries to promote their innovative products.

Bannister (Ref 20) acknowledged that reporting quantifiable successes remains a dilemma for there is no formal process to gain empirical evidence to support the degree of successful commercialization within the program. More importantly, he noted that such a requirement does not exist, either in statute or policy, for companies to provide such data. This failure to gather empirical evidence and a reliance upon anecdotal methods such as media stories and "word of mouth" may serve to hinder the organization's ability to comply with the annual performance reporting requirements required by GPRA provisions and the 2000 SBIR program reauthorization.

G. SBIR FIRM RECOMMENDATIONS FOR IMPROVEMENT

The researcher found that this study provided valuable insight into the factors that affect proposal construction. One of the most illuminating sections of the survey was the follow-up dialog between the researcher and the surveyed firms. The Army is fortunate to have such a motivated base of research firms competing to provide ground-breaking technologies to solve emerging requirements. Some specific comments from firms

indicate opportunities for improvement within the program. Firms provided the following responses when asked how they would improve the program:

"Reduce the focus of outside investment."

"Focus research on areas that lend themselves to commercial products."

"Increase the contract award amount to keep pace with business cost."

H. SURVEY DESIGN FEEDBACK

Subsequent review of the data provided evidence that ten questions on the original survey instrument used in this study to be of little use. Overall, the firms surveyed were reluctant to reveal personal information about matters such as the number of founders, their backgrounds, and when the firm was started. Additionally, questions that involved estimates from technical personnel, such as expected sales, returned a series of vague responses that did not add value to the project nor would have any tangible impact on future program assessments

I. SUMMARY

This chapter presented the survey data and provided an analysis of their respective impacts on the program. Summarized results of key questions were provided along with a narrative interpretation of what the results mean in terms of sales, marketing strategy, customer type, and types of products produced.

Based on the survey results it is clear that the program is successful in producing a return on investment that is substantially higher than the DoD average; that the DoD is the primary beneficiary of the Army SBIR research efforts; that research firms would not be involved in Army SBIR efforts if the program were to cease it existence; and that

solicitation evaluation procedures do impact each research firm's approach to proposal development.

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V. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION.

"There is great room for upward change." (Ref 26)

This chapter provides the conclusions and recommendations for the data collected from SBIR participants. 37 research firms responded to 25 closed end questions. The results of the survey are used to answer the primary and secondary research questions outlined in Chapter I.

B. CONCLUSIONS

The Army is successfully achieving its SBIR program commercialization goals. The average sales per award clearly indicate that the Army projects surveyed are outperforming both DoD and Fast Track award averages.

Firms receiving SBIR funding are producing useful products that fulfill DoD requirements. The DoD consumption of 85% of Army SBIR results indicate that Army SBIR solicitations are filling vital DoD research requirements that may not otherwise be satisfied

C. RECOMMENDATIONS

This survey provides several lessons about how firms view the SBIR program and how those views impact their approach to each solicitation. The following are recommendations to assist ARO-W (A) in capitalizing on each firms' already strong desire to participate in the program. They also provide a mechanism for ARO-W (A) to

collect the requisite data to fulfill reporting requirements mandated by the Government Performance and Results Act.

1. Minimize the Emphasis on Commercialization

The empirical data clearly proves that DoD is the main consumer of Army SBIR technological developments. Reducing the commercialization evaluation factor weight will encourage firms to provide the best approaches to Army research requirements.

2. Conduct Regular Program Surveys

The data to gauge program effectiveness is available, but a regular mechanism is needed to capture it. The collection of this data will be helpful in preparing annual performance reports for GPRA reporting requirements. An electronic version of the proposed survey instrument in Appendix B could be used to perform this task.

Additionally, it is recommended that contracting officer technical representatives at Army Labs and RDECs conduct the survey. They will have a working relationship with the performing research firms that can enhance the quality of the collected data.

3. Use a Small Survey Population to Prepare Program Results

Because the program is relatively stable, a small sample size will be sufficient to achieve a level of certainty required to present a suitable projection of program benefits. The key point to remember is that this program accounts for only 2.5% of an agency's extramural budget in excess of $100 million. Since we do not provide as much scrutiny to large businesses with respect to how well they have commercialized their Federally sponsored research funding, the level of confidence needed to fulfill the GPRA report requirement should weigh the estimated costs of data collection against the projected benefits derived from such a report.

4. Modify the Survey Instrument to Enhance Responsiveness

The researcher recommends modifying the survey instrument to reflect questions of greatest impact for assessing program success. Reducing the number of questions and simplifying the survey could enhance future response rates. A sample survey reflecting the questions of greatest impact is enclosed in Appendix B.

D. ANSWERS TO RESEARCH QUESTIONS

1. Primary Research Questions

How does the Army define and measure Small Business Innovation Research (SBIR) Program success?

The Army defines program success as complying with DoD's four stated goals; 1) stimulating technological innovation, 2) using small businesses to meet Federal research and development needs, 3) fostering participation of minority and disadvantaged firms in technological innovation, and 4) increasing private-sector commercialization of innovations derived from Federal research. It further defines program success as funding research proposals that provide the best technological solutions to Army research needs.

The relative measure for success is a function of funding all high quality proposals until program funds are fully expended.

2. Subsidiary Research Questions

- What are the Small Business Innovation Research (SBIR) and Fast Track Programs?

The SBIR program is a set-aside effort that allows small businesses to participate in Federal research initiatives. The Fast Track program is an expedited proposal review process that provides preferential treatment to firms that secure outside investment to augment Government provided research funding.

- What are the stated goals of the DoD SBIR Program?

The stated goals of the DoD SBIR program are to:

a) stimulate technological innovation;

b) use small business to meet Federal research and development needs;

c) foster and encourage participation by minority and disadvantaged persons in technological innovation; and

d) increase private-sector commercialization of innovations derived from Federal research and development.

- What are the various laws, regulations, and policies that might affect the SBIR and Fast Track Programs?

The Small Business Innovation Development Act in 1982 provided the foundation for the SBIR program. Successive reauthorizations via the Small Business Research and Development Enhancement Act of 1992 and 2000 have added the commercialization tenet that currently dominates the focus of the program.

- What major products are created through the Army SBIR program and how does the Department of Defense integrate those products into its inventory?

The Army SBIR program requirements cover the full spectrum of research solutions. Software applications, intermediate and final hardware components, process technologies, and new or improved service capabilities are the major products of the SBIR program.

Products are integrated into the inventory through acquisition of the technology or final product. The Army seeks to accomplish this task by linking the contractor with the

Army Lab or RDEC responsible for developing the requirement. This linkage ensures that future related research efforts will have some intrinsic knowledge of past SBIR projects.

- How does the Department of the Army track the commercialization of SBIR products through the program's life cycle?

It does not have a formal mechanism to accomplish this task. The Army SBIR effort relies on "word of mouth" success stories or media exposure to gauge Phase III success.

- Do current Department of the Army requirements generation, marketing, solicitation, proposal evaluation, source selection and surveillance procedures lead to enhanced program success and greater commercialization of products?

The answer is yes and no. Congress has determined that the program is successful in accomplishing its program goals, but there are no recurrent empirical measures through which the Army, or any other agency, can readily use to substantiate that statement.

- What changes are needed to the Department of the Army's SBIR Program to enhance the program's performance as it relates to stated goals?

A review of the evaluation factors to support superior technical approaches and to minimize the impact of outside investment is recommended to enhance program execution.

E. AREAS OF FURTHER RESEARCH

There are still several issues that can be addressed in further detail. While the data show that the program is clearly successful from a sales perspective, the ability to quantitatively measure how well other program goals are fulfilled is a problem. The researcher recommends further study to determine how program participation by

disadvantaged and minority firms could be increased. Additionally, further study is needed to determine how Army solicitation requirements can be drafted to capitalize on dual use applications that could enhance the commercialization potential of future SBIR awards and products.

Army SBIR Award Survey Questions

Proposal Title:

Principle Investigator:
Phase II Contract #:

1. Is the information listed above correct?

☐ Yes. Go to Question 2
☐ No. Provide correct information below then proceed to Question 2.

Title:
Principle Investigator:
Phase II Contract Number:

2. What is the current status of this SBIR Project? *(Check one)*

☐ Project has not yet completed Phase II.
☐ Project completed Phase II.
☐ Project was not awarded a Phase II.
☐ Don't Know

3. How do you expect to commercialize your SBIR award? *(Check one)*

☐ No Commercial Product, Process, or Service is Planned
☐ Software
☐ Intermediate Hardware Product or Component
☐ Final Hardware Product
☐ Process Technology
☐ New or Improved Service Capability
☐ Don't Know

Question 4 concerns whether the project is still active or if and when it was dropped.

4. When did your company drop the project? *(Check one)*

☐ During or at the end of Phase II
☐ Within one year after completing Phase II.
☐ More than one year after completing Phase II.
☐ Still Active, not dropped.
☐ Don't Know

If the technology developed during this project has led to no additional developmental funding or sales (and neither of these is expected to occur), skip to Question 16.

Additional Developmental Funding and Sales

PLEASE READ THE FOLLOWING DEFINITIONS

Additional Developmental Funds: Include funds from federal or private sector sources, or from your own company, used for further development of the technology develop during the Phase II project.

Sales: All sales of a product, process, or service, to Federal ***or*** Private Sector Customers resulting from the technology developed during this Phase II project.
(Includes the sale of technology or rights, etc.)

5. To date, what has been the total additional developmental funding for the technology developed during this project?
(Do not include related SBIR funds received from DoD or other federal agencies. Enter dollars provided by each of the following sources. If none, enter zero.)

Sources	Dollars
a. Non-SBIR Federal Funds	
b. Your Own Company	
c. Other Private Company	
d. U.S. Venture Capital Institution	
e. Foreign Venture Capital Institution	
f. Private Investor	
g. Personal Funds	
h. State or Local Governments	
i. College or Universities	
j. Other Sources (Specify)	

☐ Don't Know

your company's activities with other companies and investors?
(Check all that apply)

Activities	Ongoing Negotiations	Finalized Agreements
a. Licensing Agreement	☐	☐
b. Sale of Complete Ownership	☐	☐
c. Sale of Partial Ownership	☐	☐
d. Sale of Technology Rights	☐	☐
e. Joint Venture Agreement	☐	☐
f. Marketing/Distribution Agreement	☐	☐
g. Manufacturing Agreement	☐	☐
h. Other	☐	☐
i. Don't know	☐	☐

7. Which of the following, if any, describes the type and status of marketing activities by your company and/ or your licensee for this project?
(Check only one block for each activity)

Marketing Activity	Planned	Underway	Completed	Not Needed	Don't Know
a. Preparation of Marketing	☐	☐	☐	☐	☐
b. Hiring of Marketing Staff	☐	☐	☐	☐	☐
c. Publicity/Advertising	☐	☐	☐	☐	☐
d. Test Marketing	☐	☐	☐	☐	☐
e. Other (Specify):	☐	☐	☐	☐	☐

8. Has your company and /or licensee had any actual sales of products, processes, services or other sales from the technology developed during this project? *(Check all that apply.)*

a. Sales of Product(s) ☐
b. Sales of Process(es) ☐
c. Sales of Services(s) ☐
d. Other Sales (e.g., rights to technology, etc) ☐

e. No Sales to Date ☐ → Skip to Question 11

approximate amount of total sales resulting from the technology developed during this project? If multiple SBIR projects contributed to the ultimate product, report only the share of total sales appropriate to this SBIR project.
(Enter dollars[$]. If none, enter 0[zero].)

Year when First Sale Occurred ☐

Total Sales Dollars of Product(s) Process(es) or Service(s) to Date ☐

Other Total Sales Dollars (e.g., Rights to technology, etc.) to Date ☐

10. To date, what percent of total sales from the technology developed during this project have gone to the following customers?
(If none, enter 0[zero]. Round percentages. Answers should add to 100%)

☐ Private Sector
☐ Department of Defense (DoD)
☐ Prime Contractors for DoD
☐ NASA
☐ Other Federal Agencies
☐ State or Local Governments
☐ Export Markets
☐ Other (Specify)
☐ Don't Know

11. Expected Sales. For your company and/or your licensee, what is the approximate amount of total sales expected between now and the end of 2002 resulting from technology developed during this project? *(If none, enter 0 [zero])*

If no sales to date, what year do your expect your first sale?

☐ 2001 ☐ 2002 ☐ 2003 ☐ Later than 2003

Total Sales Dollars of Product (s), Process(es) or Services(s) expected between now and the end of 2002. ☐

Other Total Sales Dollars (e.g., rights to technology, ect.) expected between now and the end of 2002. ☐

☐ Don't Know

Program?

☐ Yes
☐ No → Skip to Question 15
☐ Don't Know

Questions 13 & 14 apply to Fast Track Participants

13. What sources provided matching or co-investment funding that enabled your company to apply for Phase II under Fast Track?
(Check all that apply)

a. Venture Capital Firm Provided Funding. ☐
b. Another Company Provided Funding. ☐
c. Another Company Provided Facilities, Equipment and/or Other in Kind Support. ☐
d. Own Company Provided Funding. ☐
e. Don't Know ☐

14. How long in months did it take to obtain and finalize Agreements(s) for third party funding/in kind support?

☐ Months

15. Prior to your SBIR award, did your company receive funds for research or development of the technology in this project from any of the following sources?
(Check all that apply)

☐ Prior SBIR
☐ Prior non-SBIR Federal R&D
☐ Venture Capital
☐ Other Private Company
☐ Private Investor
☐ Internal Company Investment
☐ State or Local Government
☐ College or University
☐ Don't Know
☐ No

Other Company and Project Related Information

16. In your opinion, in the absence of this SBIR award, would your company have undertaken this project? *(Check one)*

- ☐ Definitely Not
- ☐ Probably Not
- ☐ Uncertain
- ☐ Probably Yes
- ☐ Definitely Yes

17. What year was your company founded? ☐

18. Information on company founders.

a. Number of founders. ☐
b. Number of founders with a business background. ☐
c. Don't Know ☐

19. Most recent employment of founders prior to founding this company? (Check all that apply)

- ☐ Other Private Company
- ☐ College or University
- ☐ Government
- ☐ Don't Know

20. Total revenue for the company during your fiscal year (or calendar year) 2000. *(Check One)*

- ☐ Less than $100,000
- ☐ $100,000 to $499,999
- ☐ $500,000 to $999,000
- ☐ $1,000,000 to $4,999,999
- ☐ $5,000,000 to $19,999,999
- ☐ More than $20,000,000

award?

- ☐ Prior Phase I awards
- ☐ Prior Phase II awards
- ☐ Don't Know

22. Please give the number of patents, copyrights, and/or scientific publications for the technology developed during this project.
(Enter number. If none, enter 0 [zero])

	Number Applied for/Submitted	Number Received/Published
Patents(s)		
Scientific Publications		
Don't Know		

23. Which, if any, of the following has your company experienced as a result of the technology developed during this project?
(Check all that apply)

- ☐ Made an initial public stock offering in ☐ *(enter year)*
- ☐ Planned an initial public stock offering.
- ☐ Established one or more spin-off companies.
- ☐ None of the above.
- ☐ Don't Know

24. Employee Information.
(Enter the number of employees)

- ☐ Number of employees when Phase II began
- ☐ Current number of employees
- ☐ Number of employees **hired** as a direct result of the technology developed during this Phase II project.

a. I believe outside investment by a third party is proof of the commercial potential of a research project.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Neither agree nor disagree
- [ ] Disagree
- [ ] Strongly Disagree

b. I would change a superior technical research approach to a slightly lesser research approach if I could gain access to outside investment.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Neither agree nor disagree
- [ ] Disagree
- [ ] Strongly Disagree

c. Raising the interest of outside investors for SBIR research topics is challenging.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Neither agree nor disagree
- [ ] Disagree
- [ ] Strongly Disagree

26. Please provide the following information about the person who completed this questionnaire.

Name:

Title:

Telephone:

E-Mail:

Company URL:

27. Would you like an e-mail version of the final report?

[ ] Yes [ ] No

Appendix B

Army SBIR Award Survey

Title:

Principle Investigator:

Phase II Contract #:

1. Is the information listed above correct?

☐ Yes. Go to Question 2

☐ No. Provide correct information below then proceed to Question 2.

Title:
Principle Investigator:
Phase II Contract Number:

2. How do you expect to commercialize your SBIR award? *(Check one)*

☐ No Commercial Product, Process, or Service is Planned

☐ Software

☐ Intermediate Hardware Product or Component

☐ Final Hardware Product

☐ Process Technology

☐ New or Improved Service Capability

☐ Don't Know

Question 3 concerns whether the project is still active or if and when it was dropped.

3. When did your company drop the project? *(Check one)*

☐ During or at the end of Phase II

☐ Within one year after completing Phase II.

☐ More than one year after completing Phase II.

☐ Still Active, not dropped.

☐ Don't Know

If the technology developed during this project has led to no additional developmental funding or sales (and neither of these is expected to occur), skip to Question 16.

Additional Developmental Funding and Sales

PLEASE READ THE FOLLOWING DEFINITIONS

Additional Developmental Funds: Include funds from federal or private sector sources, or from your own company, used for further development of the technology develop during the Phase II project.

Sales: All sales of a product, process, or service, to Federal ***or*** Private Sector Customers resulting from the technology developed during this Phase II project.
(Includes the sale of technology or rights, etc.)

4. To date, what has been the total additional developmental funding for the technology developed during this project?
(Do not include related SBIR funds received from DoD or other federal agencies. Enter dollars provided by each of the following sources. If none, enter zero.)

Sources	Dollars
a. Non-SBIR Federal Funds	
b. Your Own Company	
c. Other Private Company	
d. U.S. Venture Capital Institution	
e. Foreign Venture Capital Institution	
f. Private Investor	
g. Personal Funds	
h. State or Local Governments	
i. College or Universities	
j. Other Sources (Specify)	

☐ Don't Know

your company's activities with other companies and investors?
(Check all that apply)

Activities	Ongoing Negotiations	Finalized Agreements
a. Licensing Agreement	☐	☐
b. Sale of Complete Ownership	☐	☐
c. Sale of Partial Ownership	☐	☐
d. Sale of Technology Rights	☐	☐
e. Joint Venture Agreement	☐	☐
f. Marketing/Distribution Agreement	☐	☐
g. Manufacturing Agreement	☐	☐
h. Other	☐	☐
i. Don't know	☐	☐

6. Which of the following, if any, describes the type and status of marketing activities by your company and/ or your licensee for this project?
(Check only one block for each activity)

Marketing Activity	Planned	Underway	Completed	Not Needed	Don't Know
a. Preparation of Marketing	☐	☐	☐	☐	☐
b. Hiring of Marketing Staff	☐	☐	☐	☐	☐
c. Publicity/Advertising	☐	☐	☐	☐	☐
d. Test Marketing	☐	☐	☐	☐	☐
e. Other (Specify):	☐	☐	☐	☐	☐

7. Has your company and /or licensee had any actual sales of products, processes, services or other sales from the technology developed during this project? *(Check all that apply.)*

a. Sales of Product(s) ☐
b. Sales of Process(es) ☐
c. Sales of Services(s) ☐
d. Other Sales (e.g., rights to technology, etc) ☐

e. No Sales to Date ☐ → Skip to Question 10

approximate amount of total sales resulting from the technology developed during this project? If multiple SBIR projects contributed to the ultimate product, report only the share of total sales appropriate to this SBIR project.
(Enter dollars[$]. If none, enter 0[zero].)

Year when First Sale Occurred	
Total Sales Dollars of Product(s) Process(es) or Service(s) to Date	
Other Total Sales Dollars (e.g., Rights to technology, etc.) to Date	

9. To date, what percent of total sales from the technology developed during this project have gone to the following customers?
(If none, enter 0[zero]. Round percentages. Answers should add to 100%)

	Private Sector
	Department of Defense (DoD)
	Prime Contractors for DoD
	NASA
	Other Federal Agencies
	State or Local Governments
	Export Markets
	Other (Specify)
	Don't Know

10. Prior to your SBIR award, did your company receive funds for research or development of the technology in this project from any of the following sources?
(Check all that apply)

	Prior SBIR
	Prior non-SBIR Federal R&D
	Venture Capital
	Other Private Company
	Private Investor
	Internal Company Investment
	State or Local Government
	College or University
	Don't Know
	No

Other Company and Project Related Information

11. In your opinion, in the absence of this SBIR award, would your company have undertaken this project? *(Check one)*

- ☐ Definitely Not
- ☐ Probably Not
- ☐ Uncertain
- ☐ Probably Yes
- ☐ Definitely Yes

12. Total revenue for the company during your fiscal year (or calendar year) 2000. *(Check One)*

- ☐ Less than $100,000
- ☐ $100,000 to $499,999
- ☐ $500,000 to $999,000
- ☐ $1,000,000 to $4,999,999
- ☐ $5,000,000 to $19,999,999
- ☐ More than $20,000,000

13. How many federal agency SBIR awards has your company received prior to this Phase II award?

- ☐ Prior Phase I awards
- ☐ Prior Phase II awards
- ☐ Don't Know

14. Please give the number of patents, copyrights, and/or scientific publications for the technology developed during this project.
(Enter number. If none, enter 0 [zero])

	Number Applied for/Submitted	Number Received/Published
Patents(s)	☐	☐
Scientific Publications	☐	☐
Don't Know	☐	☐

(Enter the number of employees)

	Number of employees when Phase II began
	Current number of employees
	Number of employees **hired** as a direct result of the technology developed during this Phase II project.

16. Please provide the following information about the person who completed this questionnaire.

Name:

Title:

Telephone:

E-Mail:

Company URL:

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APPENDIX C – RAW DATA TABULATIONS

		Current SBIR Project Status				How do you expect to commercialize your award?							When did you drop the project?				Non-SBIR Additional Developmental Funding				
FY	Firm	2a	2b	2c	2d	3a	3b	3c	3d	3e	3f	3g	4a	4b	4c	4d	4e	5a	5b	5c	5d	5e	5f
96	Firm 1		1				1									1		$200,000					
96	Firm 2		1						1							1			$244,000				
96	Firm 3		1													1							
96	Firm 4				1			1								1							
96	Firm 5		1							1						1		$47,000	$12,000	$207,500			
96	Firm 6		1						1							1		$0					
96	Firm 7		1						1						1								
96	Firm 8		1						1							1		$458,490	$0	$30,000			
96	Firm 9		1				1									1			$18,000	$495,224			
96	Firm 10		1				1									1							
96	Firm 11		1				1									1							
96	Firm 12		1									1			1								
97	Firm 13		1							1						1			$5,000				
97	Firm 14		1				1		1							1		$700,000	$1,000,000				
97	Firm 15		1				1									1		$120,000					
97	Firm 16		1						1							1							
97	Firm 17		1				1									1		$450,000	$250,000				$450,000
97	Firm 18		1				1									1							
97	Firm 19		1						1							1			$150,000				
97	Firm 20		1				1						1										
97	Firm 21		1						1							1							
97	Firm 22				1				1							1							
97	Firm 23		1						1							1		$198,000	$200,000				
97	Firm 24		1				1									1		$1,065,000					
97	Firm 25		1					1					1						$800,000				
97	Firm 26				1							1			1								
97	Firm 27		1													1							
97	Firm 28		1					1								1							

		Current SBIR Project Status				How do you expect to commercialize your award?							When did you drop the project?					Non-SBIR Additional Developmental Funding					
FY	Firm	2a	2b	2c	2d	3a	3b	3c	3d	3e	3f	3g	4a	4b	4c	4d	4e	5a	5b	5c	5d	5e	5f
98	Firm 29	1										1				1			$9,058				
98	Firm 30	1																					
98	Firm 31		1							1						1		$1,200,000	$200,000				
98	Firm 32	1													1								
98	Firm 33		1				1									1		$450,000					
98	Firm 34	1							1							1		$750,000	$100,000	$200,000			
98	Firm 35		1													1							
98	Firm 36		1						1							1			$50,000				
98	Firm 37		1				1									1							

		Non-SBIR Additional Developmental Funding					Ongoing Negotiations									Finalized Agreements								
FY	Firm	5g	5h	5i	5j	5k	6a	6b	6c	6d	6e	6f	6g	6h	6i	6a	6b	6c	6d	6e	6f	6g	6h	6i
96	Firm 1																							
96	Firm 2													1										
96	Firm 3																							
96	Firm 4											1												
96	Firm 5	$8,000	$123,000													1								
96	Firm 6																							
96	Firm 7																							
96	Firm 8				$200,000		1				1	1	1			1							1	
96	Firm 9										1													
96	Firm 10																							
96	Firm 11																							
96	Firm 12																							
97	Firm 13						1																	
97	Firm 14																							
97	Firm 15																				1	1		
97	Firm 16						1																	
97	Firm 17	$100,000					1							1										
97	Firm 18																							
97	Firm 19																							
97	Firm 20																							
97	Firm 21																							
97	Firm 22																							
97	Firm 23																							
97	Firm 24						1																	
97	Firm 25																							
97	Firm 26																							
97	Firm 27																							
97	Firm 28																							

		Non-SBIR Additional Developmental Funding					Ongoing Negotiations									Finalized Agreements								
FY	Firm	5g	5h	5i	5j	5k	6a	6b	6c	6d	6e	6f	6g	6h	6i	6a	6b	6c	6d	6e	6f	6g	6h	6i
98	Firm 29																							
98	Firm 30																							
98	Firm 31																							
98	Firm 32																							
98	Firm 33																							
98	Firm 34						1					1												
98	Firm 35						1																	
98	Firm 36																							
98	Firm 37																							

		Marketing Activity Planned					Marketing Activity Underway					Marketing Activity Completed					Marketing Activity Not Needed					Marketing Activities Unknown				
FY	Firm	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e
96	Firm 1																									
96	Firm 2	1	1			1	1		1	1																
96	Firm 3																									
96	Firm 4	1	1	1	1																					
96	Firm 5						1	1	1	1																
96	Firm 6																									
96	Firm 7																									
96	Firm 8				1				1			1						1								
96	Firm 9																									
96	Firm 10																									
96	Firm 11																									
96	Firm 12																									
97	Firm 13				1		1		1									1								
97	Firm 14											1	1	1	1											
97	Firm 15		1																							
97	Firm 16	1			1																					
97	Firm 17		1				1		1	1	1							1	1							
97	Firm 18		1															1								
97	Firm 19																									
97	Firm 20																									
97	Firm 21		1															1								
97	Firm 22																									
97	Firm 23		1					1																		
97	Firm 24						1	1						1	1											
97	Firm 25								1			1	1													
97	Firm 26																									
97	Firm 27																									
97	Firm 28	1			1																					

		Marketing Activity Planned					Marketing Activity Underway					Marketing Activity Completed					Marketing Activity Not Needed					Marketing Activities Unknown				
FY	Firm	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e	7a	7b	7c	7d	7e
98	Firm 29	1		1														1		1	1					
98	Firm 30																									
98	Firm 31		1	1			1													1						
98	Firm 32		1					1																		
98	Firm 33																	1								
98	Firm 34																	1								
98	Firm 35			1																						
98	Firm 36	1	1																							
98	Firm 37		1																							

		Actual Sales Data					SBIR Sales Data				Percentage of Sales of SBIR Products			
FY	Firm	8a	8b	8c	8d	8e	9a Yr	9b	9c	9b+9c	10a	Amount	10b	Amount
96	Firm 1						1999	$300,000		$300,000		$0	90%	$270,000
96	Firm 2				1		1999	$10,000		$10,000		$0		$0
96	Firm 3									$0		$0		$0
96	Firm 4	1					2000	$38,000		$38,000		$0	100%	$38,000
96	Firm 5		1				2000	$127,200	$184,000	$311,200	70%	$217,840		$0
96	Firm 6									$0		$0		$0
96	Firm 7						1999	$100,000		$100,000		$0		$0
96	Firm 8		1				2001	$30,000	$250,000	$280,000	10%	$28,000	90%	$252,000
96	Firm 9	1								$0		$0		$0
96	Firm 10									$0		$0		$0
96	Firm 11						1998	$158,725		$158,725		$0	100%	$158,725
96	Firm 12									$0		$0		$0
97	Firm 13	1								$0		$0		$0
97	Firm 14		1				1998	$5,000	$0	$5,000	30%	$1,500		$0
97	Firm 15						1999	$28,000		$28,000	50%	$14,000	50%	$14,000
97	Firm 16	1					1999	$23,000		$23,000	60%	$13,800	40%	$9,200
97	Firm 17				1		1998	$450,000	$0	$450,000		$0	100%	$450,000
97	Firm 18						2000	$110,000		$110,000		$0	100%	$110,000
97	Firm 19									$0		$0		$0
97	Firm 20									$0		$0		$0
97	Firm 21						2000	$524,000		$524,000	10%	$52,400	85%	$445,400
97	Firm 22						1998	$120,000		$120,000		$0	100%	$120,000
97	Firm 23									$0		$0		$0
97	Firm 24		1		1		1997	$1,650,000	$0	$1,650,000		$0	90%	$1,485,000
97	Firm 25	1								$0		$0		$0
97	Firm 26									$0		$0		$0
97	Firm 27									$0		$0		$0
97	Firm 28	1								$0		$0		$0

		Actual Sales Data					SBIR Sales Data				Percentage of Sales of SBIR Products			
FY	Firm	8a	8b	8c	8d	8e	9a Yr	9b	9c	9b+9c	10a	Amount	10b	Amount
98	Firm 29	1								$0		$0		$0
98	Firm 30									$0		$0		$0
98	Firm 31	1					2000	$400,000		$400,000		$0	95%	$380,000
98	Firm 32						1999	$130,000		$130,000		$0	100%	$130,000
98	Firm 33						2000	$450,000		$450,000		$0	100%	$450,000
98	Firm 34	1					1997	$50,000	$0	$50,000	0%	$0	100%	$50,000
98	Firm 35	1								$0		$0		$0
98	Firm 36					1				$0		$0		$0
98	Firm 37						2001	$60,000		$60,000		$0	100%	$60,000

		Percentage of Sales of SBIR Products											
FY	Firm	10c	Amount	10d	Amount	10e	Amount	10f	Amount	10g	Amount	10h	Amount
96	Firm 1	10%	$30,000		$0		$0		$0		$0		$0
96	Firm 2	100%	$10,000		$0		$0		$0		$0		$0
96	Firm 3		$0		$0		$0		$0		$0		$0
96	Firm 4		$0		$0		$0		$0		$0		$0
96	Firm 5	30%	$93,360		$0		$0		$0		$0		$0
96	Firm 6		$0		$0		$0		$0		$0		$0
96	Firm 7	100%	$100,000		$0		$0		$0		$0		$0
96	Firm 8		$0		$0		$0		$0		$0		$0
96	Firm 9		$0		$0		$0		$0		$0		$0
96	Firm 10		$0		$0		$0		$0		$0		$0
96	Firm 11		$0		$0		$0		$0		$0		$0
96	Firm 12		$0		$0		$0		$0		$0		$0
97	Firm 13		$0		$0		$0		$0		$0		$0
97	Firm 14	10%	$500		$0		$0		$0	60%	$3,000		$0
97	Firm 15		$0		$0		$0		$0		$0		$0
97	Firm 16		$0		$0		$0		$0		$0		$0
97	Firm 17		$0		$0		$0		$0		$0		$0
97	Firm 18		$0		$0		$0		$0		$0		$0
97	Firm 19		$0		$0		$0		$0		$0		$0
97	Firm 20		$0		$0		$0		$0		$0		$0
97	Firm 21		$0	5%	$26,200		$0		$0		$0		$0
97	Firm 22		$0		$0		$0		$0		$0		$0
97	Firm 23		$0		$0		$0		$0		$0		$0
97	Firm 24	10%	$165,000		$0		$0		$0		$0		$0
97	Firm 25		$0		$0		$0		$0		$0		$0
97	Firm 26		$0		$0		$0		$0		$0		$0
97	Firm 27		$0		$0		$0		$0		$0		$0
97	Firm 28		$0		$0		$0		$0		$0		$0

		Percentage of Sales of SBIR Products											
FY	Firm	10c	Amount	10d	Amount	10e	Amount	10f	Amount	10g	Amount	10h	Amount
98	Firm 29		$0		$0		$0		$0		$0		$0
98	Firm 30		$0		$0		$0		$0		$0		$0
98	Firm 31		$0	5%	$20,000		$0		$0		$0		$0
98	Firm 32		$0		$0		$0		$0		$0		$0
98	Firm 33		$0		$0		$0		$0		$0		$0
98	Firm 34		$0		$0		$0		$0		$0		$0
98	Firm 35		$0		$0		$0		$0		$0		$0
98	Firm 36		$0		$0		$0		$0		$0		$0
98	Firm 37		$0		$0		$0		$0		$0		$0

		Fast Track Application			Source of Fast Track Capital					Months before finalizing agreements	Funding Source Prior to SBIR Award								
FY	Firm	12a	12b	12c	13a	13b	13c	13d	13e	14	15a	15b	15c	15d	15e	15f	15g	15h	15i
96	Firm 1		1								1								
96	Firm 2		1								1								
96	Firm 3			1															
96	Firm 4		1																
96	Firm 5		1																
96	Firm 6		1																
96	Firm 7		1																
96	Firm 8		1																
96	Firm 9			1															
96	Firm 10		1																
96	Firm 11		1																
96	Firm 12		1																
97	Firm 13		1																
97	Firm 14		1																
97	Firm 15		1								1	1			1	1			
97	Firm 16		1												1				
97	Firm 17	1			1	1				9						1			
97	Firm 18		1																
97	Firm 19		1																
97	Firm 20		1											1					
97	Firm 21		1																
97	Firm 22		1																
97	Firm 23			1															
97	Firm 24	1							1	12						1	1		
97	Firm 25	1						1								1			
97	Firm 26			1															
97	Firm 27			1															
97	Firm 28		1																

		Fast Track Application			Source of Fast Track Capital					Months before finalizing agreements	Funding Source Prior to SBIR Award								
FY	Firm	12a	12b	12c	13a	13b	13c	13d	13e	14	15a	15b	15c	15d	15e	15f	15g	15h	15i
98	Firm 29		1								1								
98	Firm 30		1																
98	Firm 31		1										1		1				
98	Firm 32		1																
98	Firm 33		1																
98	Firm 34		1							24									
98	Firm 35		1								1	1							
98	Firm 36		1																
98	Firm 37		1																

		Would firm have undertaken project w/o SBIR Funding						Yr Founded	Founders Information			Most Recent Founder Employment Situation			
FY	Firm	16a	16b	16c	16d	16e	16f	17	18a	18b	18c	19a	19b	19c	19d
96	Firm 1				1			91	1	0	0	1			
96	Firm 2	1						92	2	1	1	1			
96	Firm 3	1						83	1	2	1	1			
96	Firm 4		1					70	1	2	0	1			
96	Firm 5	1						96	1	1	0	1			
96	Firm 6	1						90	2	1	0	1			
96	Firm 7	1						93	1	0	1	1			
96	Firm 8		1					95	3	0	0	1	1		
96	Firm 9		1					83	1	2	1	1			
96	Firm 10		1					94	1	0			1		
96	Firm 11				1			82	2	1	1	1			
96	Firm 12		1					95	2	1	1	1			
97	Firm 13	1						87	1	1	0			1	
97	Firm 14	1						96	2	3	1	1			
97	Firm 15		1					94	1	1	0	1			
97	Firm 16		1					66	1	1	0	1			
97	Firm 17	1						81	2	3	0	1	1		
97	Firm 18				1			93	1	2	1	1			
97	Firm 19			1				93	1	1	0	1			
97	Firm 20		1					93	1	0	0		1		
97	Firm 21		1					90	2	0	0	1			
97	Firm 22	1						94	1	0	0		1		
97	Firm 23			1				87	2	1	1	1			
97	Firm 24	1						92	2	0	0	1			
97	Firm 25		1					94	1	2	0		1		
97	Firm 26		1					96	2	1	0	1			
97	Firm 27	1						92	1	2	0	1			
97	Firm 28	1						95	2	0	0		1		

		Would firm have undertaken project w/o SBIR Funding						Yr Founded	Founders Information			Most Recent Founder Employment Situation			
FY	Firm	16a	16b	16c	16d	16e	16f	17	18a	18b	18c	19a	19b	19c	19d
98	Firm 29	1						74	2	0	1	1			
98	Firm 30			1				92	1	4	1	1			
98	Firm 31	1						86	2	0		1			
98	Firm 32	1						96	2	1	1	1			
98	Firm 33				1			96	1	1	0	1			
98	Firm 34						1	88	2	0	0				
98	Firm 35		1					73	1	1	0	1			
98	Firm 36		1					93	1	1		1			
98	Firm 37	1						91	1	0	0		1		

		Total Revenue for the Firm in the Previous FY						# of SBIR Awards Received			Rights Data Applied For or Submitted			Rights Data Received or Published		
FY	Firm	20a	20b	20c	20d	20e	20f	21a	21b	21c	22a	22b	22c	22d	22e	22f
96	Firm 1							1			3	5		3	5	
96	Firm 2		1					2	1		0	1		0	1	
96	Firm 3				1			8	5			6			4	
96	Firm 4					1		80	31		3	5		3	5	
96	Firm 5				1			0	0		0	2				
96	Firm 6				1						1	2		1	2	
96	Firm 7				1			3	0		2	6		2	6	
96	Firm 8			1				1			6	0				
96	Firm 9				1			10	5		1	3				
96	Firm 10										2					
96	Firm 11						1	101	46		1	11		1	11	
96	Firm 12			1				1			1	3		0	3	
97	Firm 13					1		77	19		1	0		0	0	
97	Firm 14					1		1	0		1	23		1	23	
97	Firm 15							6	5		7	2		5	2	
97	Firm 16				1			55	24		1	1		1	1	
97	Firm 17		1								0	23		0	23	
97	Firm 18				1			6	2		1	3		1	3	
97	Firm 19				1			2	0		2	3		1	3	
97	Firm 20			1				4	0		1	4		1	4	
97	Firm 21						1	19	10		3	4		3	4	
97	Firm 22				1			21	3		1	2		1	1	
97	Firm 23					1					4	2		1	2	
97	Firm 24				1			1	1		4	2		0	2	
97	Firm 25				1			1	0		1	3		0	2	
97	Firm 26		1					2								
97	Firm 27										1	1		1	1	
97	Firm 28		1					3			1			1		

		Total Revenue for the Firm in the Previous FY						# of SBIR Awards Received			Rights Data Applied For or Submitted			Rights Data Received or Published		
FY	Firm	20a	20b	20c	20d	20e	20f	21a	21b	21c	22a	22b	22c	22d	22e	22f
98	Firm 29						1	22	5		1	0		0	0	
98	Firm 30										6	13		2	13	
98	Firm 31				1			4	3		3	1		3	1	
98	Firm 32							1			3	13		3	13	
98	Firm 33							4	5		4	1		4	1	
98	Firm 34				1			4	3		1	15		1	15	
98	Firm 35					1		83	36		0	1		0	1	
98	Firm 36				1			2	0		0	0				
98	Firm 37				1						3			3		

		Company Experience as a Result of the SBIR Program						Employee Information		
FY	Firm	23a	Year	23b	23c	23d	23e	24a	24b	24c
96	Firm 1					1		6	13	
96	Firm 2					1		5	5	3
96	Firm 3					1		15	13	0
96	Firm 4					1		50	60	
96	Firm 5				1			0	17	17
96	Firm 6					1		56	63	1
96	Firm 7					1		2	2	0
96	Firm 8					1		3	4	1
96	Firm 9					1		10	13	0
96	Firm 10							14	20	2
96	Firm 11					1		250	275	
96	Firm 12							12	23	
97	Firm 13					1		48	55	2
97	Firm 14					1		5	25	10
97	Firm 15					1		17	19	0
97	Firm 16					1		18	18	
97	Firm 17				1			2	7	13
97	Firm 18					1		24	24	
97	Firm 19							37	22	
97	Firm 20					1		5	4	0
97	Firm 21					1		213	224	0
97	Firm 22					1		7	10	
97	Firm 23					1		76	80	
97	Firm 24				1			7	16	9
97	Firm 25					1		4	23	6
97	Firm 26					1		4	2	2
97	Firm 27							Unsure		
97	Firm 28					1		2	2	0

		Company Experience as a Result of the SBIR Program						Employee Information		
FY	Firm	23a	Year	23b	23c	23d	23e	24a	24b	24c
98	Firm 29					1		450	643	0
98	Firm 30							15	15	
98	Firm 31					1		15	37	10
98	Firm 32					1		3	4	1
98	Firm 33					1		6	10	
98	Firm 34							6	3	6
98	Firm 35					1		30	52	0
98	Firm 36					1		4	12	0
98	Firm 37					1		91	85	4

		Is Outside investment proof of commercial potential	I would change a superior technical approach to a slightly lesser one.	Raising the interest of Outside investors is challenging
FY	Firm	25a	25a	25a
96	Firm 1	2	4	5
96	Firm 2	3	3	1
96	Firm 3	4	4	1
96	Firm 4	3	3	3
96	Firm 5	2	4	2
96	Firm 6	4	3	1
96	Firm 7	4	3	2
96	Firm 8	2	3	1
96	Firm 9	2	1	2
96	Firm 10	2	1	1
96	Firm 11	3	1	4
96	Firm 12	4	4	2
97	Firm 13	3	1	1
97	Firm 14	4	4	2
97	Firm 15	4	4	2
97	Firm 16	4	4	1
97	Firm 17	3	4	2
97	Firm 18	4	4	2
97	Firm 19	2	2	1
97	Firm 20	4	4	2
97	Firm 21	3	3	2
97	Firm 22	4	3	1
97	Firm 23	4	3	1
97	Firm 24	4	2	1
97	Firm 25	3	2	1
97	Firm 26	4	1	1
97	Firm 27	3	2	3
97	Firm 28	4	3	1

		Is Outside investment proof of commercial potential	I would change a superior technical approach to a slightly lesser one.	Raising the interest of Outside investors is challenging
FY	Firm	25a	25a	25a
98	Firm 29	4	4	2
98	Firm 30	2	2	1
98	Firm 31	3	2	2
98	Firm 32	3	3	1
98	Firm 33	3	3	3
98	Firm 34	3	2	1
98	Firm 35	2	2	2
98	Firm 36	2	4	2
98	Firm 37	2	1	1

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